

REMARKSTechnical matters

1. Accompanying this amendment is a new executed declaration correctly setting forth the name of the inventor.
2. Also accompanying this amendment is a corrected drawing sheet and a redlined version of the original sheet showing the proposed changes. In response to the Examiner's objections, the corrected drawings add an indication of axial length (of less than 22 millimeters) in Figs. 1 and 2 so as to show that feature which is claimed in claims 10 and 18 of the invention. No new matter is entered thereby, since this matter was disclosed in the originally-filed specification, at page 6, paragraph 30, and page 8, paragraph 38 (i.e., claims 10 and 18, which form a part of the original disclosure), which directly describe the length of the axial dimension as now specifically depicted in the corrected drawings. As stated in the specification, however, it is preferable that the axial dimension be less than 21 (rather than 22) millimeters.
3. As can be seen, the specification and claims are hereby amended to address technical matters therein noted on page 3 of the last Office Action.

Prior Art Rejections

Claims 1-20 are presently pending. Claims 10, 16, 18, and 19 are presently allowable if rewritten in independent form, while the remaining claims standing rejected over prior art. By this Amendment, all three pending independent claims (1, 11, and 17) are substantively amended to address the respective prior art rejections.

Independent claim 1 (initiator assembly) - Marshall

Independent claim 1 stands rejected as anticipated by U.S. Patent No. 6,079,332 to Marshall et al., directed to a shock-resistant detonator used in mining and blasting. Conversely, claim 1 has been amended to limit the claim to an automotive pyrotechnic initiator.

The Marshall patent neither discloses nor suggests an automotive pyrotechnic initiator with on-board circuitry, thus the anticipation rejection is traversed. Moreover, it is noted that it would not have been obvious to apply the teachings of the Marshall patent to a prior art automotive initiator. The Marshall patent is directed to a different field (detonators), and thus to a significantly larger assembly than an automotive

initiator. Consequently, there would not have been a motivation to combine the detonator of the Marshall patent with a prior art automotive initiator. Additionally, prior to the applicant's invention, including its novel means of arranging the components within the designated space permitted by standard automotive specifications, it would not have been expected that control circuitry could have been successfully incorporated within an automotive initiator, which is significantly smaller than detonators such as disclosed in the Marshall patent.

Independent claim 11 (mating connector) - Cunningham

Independent claim 11 stands rejected as anticipated by U.S. Patent No. 5,200,574 to Cunningham et al., directed to a universal connector for an automotive squib (initiator). Claim 11 has been amended to recite that the electrical interface is disposed in the connector's cylindrical wall, and that the connector is for use with an automotive initiator.

The Cunningham patent neither discloses nor suggests a mating connector with an electrical interface disposed in the cylindrical wall of an enlarged opening, thus the anticipation rejection is traversed. Instead of disposed in the wall (and thus offset to the side), the electrical connectors (e.g., 118) of the connectors disclosed in the Cunningham patent are conventionally placed centrally in the bottom of the connector.

Further, the opening of the connectors disclosed in the Cunningham patent is not enlarged so as to accommodate an initiator having on-board electronics, and is instead the conventional small opening. Again, prior to the present invention, including its novel means of arranging the components within the designated space permitted by standard automotive specifications, it would not have been expected that control circuitry could be successfully incorporated into an automotive initiator. Likewise then, there would have been no motivation to modify the opening of the connector disclosed in the Cunningham patent to enlarge it to accommodate an automotive initiator having on-board circuitry.

Independent claim 17 (initiator & mating connector) - Marshall & Cunningham

Independent claim 17 stands rejected as obvious over the combination of the Marshall patent and the Cunningham patent. As with claim 1, claim 17 has been amended to limit the claim to an automotive pyrotechnic initiator (and mating connector). Consequently, the same arguments set forth above concerning claim 1 apply to claim 17 and are incorporated here by reference. In summary, in the context of the present invention, it would not have been obvious to apply the teachings of the Marshall patent, which is in the detonator field, to an

automotive initiator such as that taught in the Cunningham patent.

There is also an additional reason why there would not have been any motivation to combine the Cunningham patent and the Marshall patent so as to result in the limitations of claim 17, which claims the initiator and mating connector together. An electrical detonator such as those disclosed in the Marshall patent has no need for an electrical connector and instead has a transducer at its end that receives pressure from a triggering shock wave and converts it into an electrical impulse. Alternately, an electrical detonator may often have a straight wire coming out of its end, through which an electrical triggering impulse is directly supplied. In any case, there is no need or motivation to use a mating connector, or therefore, to have applied the teachings of the Cunningham patent to those of a detonator such as taught in the Marshall patent.

Conclusion

It is believed that all technical matters are addressed by the present amendment. Further, claims 1-9, 11-15, and 17 should now be allowable over the prior art in addition to claims 10, 16, 18, and 19 that are already allowable in substance.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

Finally, this amendment is accompanied by a request for a two-month extension and the \$400 fee therefore. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,
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BY


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Attached: Version with Markings to Show Changes Made

Enclosures: Corrected Drawing Sheet, Redlined Drawing Sheet, New Declaration

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

[0013] FIG. 8 is a [front] top view taken through lines 8-8 of the mating connector of FIG. 7.

In the claims:

1. (Amended) An automotive pyrotechnic initiator assembly with on-board circuitry, comprising:

- e) a pyrotechnic ignition element including two electrode pins;
- f) control circuitry attached to said electrode pins;
- g) an initiator body enclosing said electrode pins and said control circuitry; and
- h) an initiator electrical interface attached to said control circuitry, said interface including an exposed portion not enclosed within said initiator body.

3. (Amended) The assembly of claim 1, wherein said automotive pyrotechnic initiator assembly includes a gas seal area, and said control circuitry is remote from said gas seal area.

4. (Amended) The assembly of claim 1, wherein said pyrotechnic ignition element includes an output can having a flared bottom that is enclosed within said initiator body.

5. (Amended) The assembly of claim 1, wherein said pyrotechnic ignition element includes an insulator cup having a flared bottom that is enclosed within said initiator body.

6. (Amended) The assembly of claim 4, wherein said pyrotechnic ignition element includes an insulator cup having a flared bottom that is enclosed within said initiator body.

7. (Amended) The assembly of claim 2, wherein said pyrotechnic ignition element includes an output can having a flared bottom that is enclosed within said initiator body.

8. (Amended) The assembly of claim 2, wherein said pyrotechnic ignition element includes an insulator cup having a flared bottom that is enclosed within said initiator body.

10. (Amended) The assembly of claim 1, wherein the overall axial length of said automotive pyrotechnic initiator assembly is less than 22 millimeters.

11. (Amended) A mating connector for use with an automotive pyrotechnic initiator assembly having enclosed on-board circuitry and an initiator electrical interface, said mating connector comprising:

- d) a mating connector body;
- e) an enlarged initiator opening defined in said mating connector body and including a generally cylindrical wall formed to receive a portion of the automotive pyrotechnic initiator assembly that contains enclosed on-board circuitry; and
- f) a bus wire connected to said mating connector body and including a bus wire electrical interface disposed within said generally cylindrical wall of said enlarged initiator opening, said bus wire electrical interface formed to mate with [the] said initiator electrical interface.

12. (Amended) The mating connector of claim 11, wherein said enlarged initiator opening includes an engagement feature formed to snugly engage said automotive pyrotechnic initiator assembly within said enlarged initiator opening.

13. (Amended) The mating connector of claim 12, wherein said engagement feature prevents the automotive pyrotechnic initiator assembly from rotating within said enlarged initiator opening.

16. (Amended) The mating connector of claim 15, wherein said bus wire electrical interface is configured to elastically deform when said automotive pyrotechnic initiator assembly is received within said enlarged initiator opening, with the resulting degree of elastic deformation of said bus wire electrical interface being selected to ensure that the automotive pyrotechnic initiator assembly is held snugly within said enlarged initiator opening and to ensure that said initiator electrical interface[s] and bus wire electrical interface are held snugly together in electrical contact.

17. (Amended) An on-board circuitry automotive pyrotechnic initiator and mating connector assembly, comprising:

- a) a pyrotechnic ignition element including two electrode pins;
- b) control circuitry attached to said electrode pins;
- c) an initiator body enclosing said electrode pins and said control circuitry;
- d) an initiator electrical interface attached to said control circuitry, said interface including an exposed portion not enclosed within said initiator body;

e) a mating connector body including an enlarged initiator opening defined therein, said enlarged initiator opening formed to receive a portion of said initiator body enclosing said control circuitry; and

f) a bus wire connected to said mating connector body and including a bus wire electrical interface disposed within said enlarged initiator opening, said bus wire electrical interface formed to mate with said initiator electrical interface.

18. (Amended) The assembly of claim 17, wherein the overall axial length of said on-board circuitry automotive pyrotechnic initiator and mating connector assembly is less than 22 millimeters when said initiator body is fully received within said enlarged initiator opening.